

These results corroborate the conventional wisdom relied upon by *Catocala* collectors for years—namely, that relative adult flight periods for different species are predictable, irrespective of regional differences in the overall timing of *Catocala* flight. It is especially noteworthy that the phenological correlations hold across six geographically distant localities that have only partially overlapping assemblages of *Catocala* species and their larval foodplants. In light of the considerable research on *Catocala* adult and larval communities conducted primarily in New England (see Sargent 1976, *op. cit.*; Gall, L. F. 1987, *Oikos* 49:172–176, and 1991a–c, *J. Res. Lepid.* 29, *in press*), this consistency in phenologies suggests that a number of the ecological paradigms drawn from the New England work will be applicable to *Catocala* faunas elsewhere in deciduous forests of eastern North America.

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HAWK MOTHS (SPHINGIDAE) IN THE WHITLEY COLLECTION FROM WALKER COUNTY, TEXAS

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Surprisingly little is known of the hawk moths (Sphingidae) of Texas. R. W. Hodges (1971, *Sphingoidea*, Fascicle 21, *The moths of America north of Mexico*, Wedge Entomol. Found. & E. W. Classey Ltd., London, 158 pp.) reported records of many species from Texas, although few specific localities were provided. The bibliography in Hodges (*op. cit.*) included no publications that list and analyze the sphingid fauna of any part of Texas, although two publications cited by Hodges discuss the sphingids of neighboring Arkansas (Freeman, H. A. 1938, *Field & Lab.* 6:33–43; Selman, C. A. & H. E. Barton 1971, *Arkansas Acad. Sci. Proc.* 25:56–58).

Here I report on a collection of sphingids from Walker County in east central Texas that is part of the Michael Whitley collection, now in the the Entomology Collection of the Houston Museum of Natural Science (HMNS). Most specimens were collected from 10 July 1971 to 19 May 1987 approximately 13 km SW of Huntsville or on the outskirts of Huntsville itself (Walker County). Specimens were collected at white light, UV light, fruit baits, and by casual daylight collecting. All specimens were collected by Michael Whitley and his family.

The climate of Walker County (data from Huntsville), is humid, warm temperate. Mean annual temperature is 19.4°C and mean annual precipitation is 1123 mm. Typically, 101 days a year have a daily maximum temperature above 32.2°C and 26 days have a daily minimum temperature below 0°C. The growing season averages 265 days (7 March to 27 November). Rainfall averages over 65 mm for each month, but warm season thunderstorms produce slight precipitation peaks in April/May and September. On average, 65 days a year experience at least 2.5 mm of precipitation; snow is uncommon.

Winds are generally from the south or southeast, but northerly winds predominate in January.

Walker County contains 1540 km² with gently rolling topography, most of which is naturally forested land. Although Walker County is generally included in the southeastern forested region (Warner, S. R. 1926, Proc. & Trans. Texas Acad. Sci. 26:83-97; Pessin, L. J. 1933, Ecology 14:1-14), vegetational types can be easily and accurately subdivided into pine forest, post oak forest, blackland prairie, and bottomland hardwoods (Warner, *op. cit.*). Much of the eastern and southeastern portions of Walker County are included within Sam Houston National Forest, where management for pine silviculture has drastically reduced the hardwood components of the natural communities.

Walker County straddles the ecotone between the East Texas Pineywoods (dominated by species of *Pinus*: Pinaceae, *Quercus*: Fagaceae, and *Carya*: Juglandaceae) and the Oak Hickory Savannah/Forest (dominated by *Quercus*, *Carya* and *Juniperus*: Pinaceae). Although sphingids are a vagile group and extra-limital dispersal is common, the sphingid fauna of Walker County illustrates the transition of a fauna from the mesic and hydric woodlands typical of the Austroriparian Biotic Province to the humid and subhumid prairies, savannahs, and woodlands of the Texan Biotic Province (Blair, W. F. 1950, Texas J. Sci. 2:93-117).

The 419 specimens of sphingids in the Whitley collection represent 26 species (Table 1). My survey of all sphingid records in Texas has produced a list of 82 species (R. W. Neck, unpubl. data). The majority of the Texas species not known from Walker County are southwestern or subtropical forms that normally are found no farther east or north than western or southern Texas, respectively. Additional species not represented in Whitley's Walker Co. collections include a number of truly tropical forms that periodically migrate far northward of their breeding ranges.

Several species in the Whitley collection were taken at both UV-light traps and fruit baits, depending upon the season. Generally only males were attracted to light, but both sexes of *Sphecodina abbotii* (Swainson) and *Darapsa pholus* (Cramer) were attracted to fruit. *Amphion floridensis* B. P. Clark was collected at both watermelon and banana bait, but not at UV light traps. *Hyles lineata* (Fabricius), a species known to fly at all times of the day (Freeman, *op. cit.*), was collected during daylight and at UV-light but not at bait.

Although this collection does not provide a complete representation of the flight phenology of the sphingids of Walker County, the data are sufficient to allow preliminary comparison with published studies in adjacent states. Local voltinism probably is controlled largely by ambient climatic regimes but also may be modified by the nutritive value of suitable food plants at various times of the year. In general, the voltinism pattern in eastern Texas resembles those of Arkansas and Kansas. Some of the observed differences may be the result of the phenology of collection efforts, e.g., *H. lineata* certainly occurs more often than the observed records of March and May. Seasonal occurrence of sphingids in tropical areas generally is related directly to rainfall periods (Owen, D. F. 1969, Proc. Royal Ento. Soc. London A44:162-168; Stradling, D. G., C. J. Legg, & F. D. Bennett 1983, Bull. Entomol. Res. 73:201-232). The spring and fall peaks of species richness in eastern Texas (Table 1) are not related solely to precipitation, which is relatively equal in all months, but occur during relatively cool periods during the growing season when reduced evaporation rates prevail. Both cold-season deciduousness in winter and warm-season moisture stress in summer eliminate or reduce, respectively, sphingid activity in eastern Texas.

An interesting departure from previously published phenology is the long flight period of *Paonias myops* (J. E. Smith) in Walker County (March/April, July, and September); Hodges (*op. cit.*, p. 86) reported that *P. myops* "seems to be single brooded." The single July and single September specimens of *P. myops* in the HMNS collection could indicate a very long-lived adult stage, an anomalous emergence time due to unusual climate regimes, or a partial second brood in this species. Unfortunately, Freeman (*op. cit.*) did not report the seasonal occurrence of *P. myops* in Arkansas, although he recorded it from six counties.

TABLE 1. SpHINGIDAE from Walker Co., Texas in the Whitley Collection (HMNS), with months of collection. Letters refer to months from March (M) to September (S). Number in parentheses is number of individuals for each species.

Species name	M	A	M	J	J	A	S
<i>Agrius cingulata</i> (7)						X	X
<i>Manduca sexta</i> (15)						X	X
<i>Manduca quinquemaculata</i> (4)					X	X	X
<i>Manduca rustica</i> (38)					X	X	X
<i>Manduca jasminearum</i> (1)						X	
<i>Dolba hyloeus</i> (9)		X	X			X	X
<i>Ceratomia amyntor</i> (4)						X	X
<i>Ceratomia undulosa</i> (16)	X	X	X		X	X	X
<i>Ceratomia catalpae</i> (3)	X					X	
<i>Ceratomia hageni</i> (19)	X	X	X	X		X	X
<i>Paratreia plebeja</i> (25)	X	X	X			X	X
<i>Smerinthus jamaicensis</i> (17)	X	X			X	X	X
<i>Paonias excaecatus</i> (28)	X	X	X			X	X
<i>Paonias myops</i> (9)	X	X			X		X
<i>Laothoe juglandis</i> (11)	X	X		X		X	X
<i>Pachysphinx modesta</i> (7)	X	X				X	X
<i>Hemaris diffinis</i> (2)						X	X
<i>Eumorphia pandorus</i> (3)					X		X
<i>Eumorphia fasciata</i> (36)						X	X
<i>Sphecodina abbotii</i> (8)				X			
<i>Deidamia inscripta</i> (21)	X	X					
<i>Amphion floridensis</i> (62)	X				X	X	
<i>Darapsa myron</i> (31)	X	X	X	X	X	X	X
<i>Darapsa pholus</i> (16)	X	X	X	X	X	X	
<i>Xylophanes tersa</i> (16)			X	X	X	X	X
<i>Hyles lineata</i> (11)	X		X				
Total species—26 (419)	15	12	9	5	10	21	19

The Whitley collection of 26 species of sphingids contains mostly species representative of the southeastern United States, which generally occur to the west only in localized populations. Interesting is the absence in this collection is of any of the widely-dispersing tropical species that are found regularly in southern Texas and that are occasionally collected far north of their normal range, e.g., species of the genera *Errinyis* and *Aellopos*. Of the 82 species of sphingids known from Texas, 57 species are likely to be encountered in Walker Co., Texas. Clearly, additional collecting is required before the sphingid fauna of this area is known completely.

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